A Nutrition Curriculum for Health Education: Its Effect on Students' Knowledge, Attitude, and Behavior

By: Carol Byrd-Bredbenner, Lily Hsu O'Connell, Barbara Shannon, James M. Eddy

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Abstract:

The objective of the study was to determine the effect of nutrition instruction, using the curriculum guides, *Nutrition In A Changing World, A curriculum for Junior High Health,* and *A Curriculum for Senior High Health,* on improving the nutrition knowledge, selected food/nutrition attitudes, and dietary behavior of students enrolled in secondary level health courses. Three groups of students were utilized including one experimental and two control groups at each level (junior high and senior high). The experimental group was pretested. taught the nutrition curriculum, and posttested. One control group was posttested only to measure the effect of the pretest on posttest performance. A second control group was pretested and posttested. Neither control group received nutrition instruction until after the study was completed. The three instruments used to collect data were a nutrition knowledge test. a food/nutrition attitude instrument, and a food frequency form, The results indicate that, at all grade levels. the experimental group had significantly improved knowledge scores. Little change in attitude scale scores was noted in grades seven and eight, while ninth grade experimental students scored significantly higher on the posttest for all attitude scales. Little improvement was seen in the posttest food frequency scores.

Article:

INTRODUCTION

Health Education courses provide an important setting for the teaching of nutrition. Survey results indicate that health teachers are interested in teaching nutrition.[1] The potential impact of teaching nutrition in Health Education courses is great, because health instruction is mandated for all students in many states. Consequently, health educators can reach the total student population.[2,3] A major obstacle to including nutrition in Health Education courses is that there are few curriculum guides. To fill the need for curriculum materials, a team of nutritionists and educators from The Pennsylvania State University developed *Nutrition In a Changing World, A Curriculum for Junior High Health'* and *Nutrition In a Changing Word, A Curriculum for Senior High School'* to assist students in developing a variety of nutrition-related skills. A nationwide survey of nutrition educators[6,7] identified curricular concepts and objectives that were used to create the framework for the curriculum guides used in the study.

The purpose of the curriculum guides is to help students attain an array of essential nutrition related skills, including reading nutrition labels, discussing the food additive controversy, evaluating fad diets for their nutritional safety, and observing associations between food and health. The scope and sequence of the curriculum guides were developed to provide students with the knowledge and skill necessary to make, Personal dietary decisions. The basic premise of the curriculum guides is that nutrition education should encompass three aspects of learning: cognitive, affective, and Psychomotor. To improve their eating habits, students must understand certain ideas about nutrition, choose and apply these ideas within their personal value systems, and develop the skills to accomplish these tasks.

At the junior high and senior high levels, the curriculum guides emphasize issues and controversies rather than nutrients, functions, food sources, and other basic nutrition informati$_o$n Topics of interest to teen-agers are presented in the hope of gaining their attention and encouraging them to continue to explore nutrition. Topics such as athletic diets, weight control, and reliable nutrition information are among those discussed.

OBJECTIVES

The major goal of the study was to determine if the curricula affected the nutrition knowledge, food/nutrition attitudes, and dietary behaviors of students enrolled in junior high health courses (seventh and eighth grades) and senior high health courses (10th and 11th grades).

PROCEDURES

Sites and Participants

Health educators from 11 secondary schools in Pennsylvania and Ohio agreed to participate in the study. These schools were located in rural, suburban, and urban areas of the states. Students in eight junior high classes and six senior high classes were the subjects.

The research design included an experimental group and two control groups within both the junior high level and the senior high level. The experimental group students were pretested, taught nutrition with the curiculum appropriate for their level, and posttested. The two control groups were not taught nutrition in their Health Education course until after the study ended. One control group was pretested and posttested. The other control group was posttested, but not pretested, to assess the effect of pretesting on posttest scores.

Teachers in the experimental group attended a one-hour in-service workshop conducted by nutritionists and educators, that included an overview of the need for nutrition education, an explanation of the study, a description of the curriculum, and a demonstration of sample teaching techniques. Curriculum guides and test instruments were distributed to the experimental teachers at the workshop.

Teachers in the control group received the test instruments and directions for administering the instruments by mail. They were sent copies of the curriculum guides after their posttest data were collected.

Instrumentation

A nutrition knowledge test, a food/nutrition attitude instrument, and a food frequency form were used to collect data at both pretest and posttest time. Students recorded their responses to the knowledge and attitude instruments on mark sense forms which are answer sheets designed for machine scoring. They reported responses to the food frequency form on the form itself.

KNOWLEDGE TEST

A table of specifications and the rules of test item construction were used to develop the knowledge test." Multiple-choice test items were constructed for each objective. Different knowledge tests were constructed for junior high and senior high to reflect the concepts taught at each level. Based on the recommendations of a panel of experts in nutrition and education who reviewed the test's first draft, revisions were made.

The revised tests were then pilot tested with secondary health students, item analyzed, and further refined. The final junior high knowledge test contained 52 items, and the final senior high knowledge test contained 56 items. The Kuder-Richardson-20 reliability coefficients" for those students participating in the study were 0.81 for junior high and 0.80 for senior high.

ATTITUDE SCALES

The same attitude instrument was used at both grade levels. It contained statements written to reflect four *a priori* constructs entitled: "I Care About Nutrition," "I Like To Eat New Foods," "I Believe Nutrition Affects Health," and "I Am Interested In Learning About Nutrition."

Some statements were worded negatively (to avoid a response set) and statements from each construct were mixed throughout the instrument. Students indicated their agreement with each statement by indicating if they strongly agree, are uncertain, disagree, or strongly disagree. The direction of each item was considered during scoring. For example, a response of "strongly disagree" for negatively worded statements and "strongly agree" for positively worded attitude statements both received a score of five.

After a panel of nutritionists reviewed the initial draft of the attitude instrument, it was revised and pilot tested with secondary health students not involved in the study. Factor analysis of pilot test responses confirmed there were four *a priori* constructs, and established the unidimensionality of each construct. Thus, the statements reflecting each construct served as the scale for examining each and the titles were abbreviated: "Caring About Nutrition" for the scale assessing interest in nutrition; "Eating New Foods" for the scale assessing liking to eat new foods; "Nutrition Affects Health" for the scale assessing belief that nutrition affects health; and "Learning About Nutrition" for the scale assessing desire to learn about nutrition (Table 1). A mean score for each scale was calculated by summing the scores of the statements in a scale and dividing by the number of statements in the scale. Mean scores could range from 5 (strongly positive) to 1 (strongly negative).

Food Frequency Form

The food frequency form evaluated dietary behavior. Students indicated on the form how frequently they consumed certain types of food. The form, adapted from the *Dietary Assessment Screening Tool,*'° was administered quickly and easily. The seven food groups included on the form were dairy products, animal protein foods, plant protein foods, vitamin C rich fruits and juices, vitamin A/folacin rich vegetables, other fruits and vegetables, and breads and cereals. A five-point scale, ranging from "hardly ever" (1 point) to "three or more times per day" (5 points), indicated the frequency of food consumption.

INSTRUCTION

Experimental teachers received curriculum guides to use in nutrition instruction during a six-10 week period in early 1981. The researchers instructed them to teach the 10 lessons written for the grade level of their students. In addition, the researchers explained how to distribute and administer the pretests and posttests. The tests were coded so that each student was given a pretest and posttest bearing the same code number.

DATA ANALYSIS

The data collected at the junior high level were analyzed separately from data collected at the senior high level. Analysis of variance on the posttest scores of the two control groups determined if pretesting affected posttest performance. analysis of covariance, with pretest scores serving as covariates, determined the effect of nutrition education on knowledge, attitude, and dietary behavior scores.

The analysis generated scores adjusted for variation in pretest scores. Stepwise regression analyses revealed the extent to which variation in the selected dependent variables of post-knowledge score, postattitude scale scores, and postdietary behavior scores could be explained by independent variables ,ex; years enrolled in home economics classes; whether or not a nutrition unit was a component of students' health classes; And the knowledge, attitude, and dietary behavior scores not used as the dependent variables. Only those variables which met the 0.15 level of significance were entered in the models.

Table 1
Nutrition Attitude Scales

Scale	Cronbach alpha reliability coefficient	Items
Caring About Nutrition	.67	I seldom think about my eating habits. I stop eating only when I cannot eat anymore. I do not care about the food I eat. I eat what I want regardless of what is good for me. I am not concerned about the number of calories in my diet. I am too busy to concern myself with nutrition. Knowing that a food is good for me has little influence on what I choose to eat.
Eating New Foods	.81	I like tasting foods I do not know about. I like to eat vegetables. I only like to eat foods I know about. I like eating different foods. I like tasting foods I have not seen before. I like trying new foods.
Nutrition Affects Health	.53	I think nutrition is important to my health. Eating well can help prevent certain diseases. The foods I eat now will help keep me healthy.
Learning About Nutrition	.84	I try hard to learn about nutrition. I like learning about food sources of nutrients. I like learning about foods and health. I like learning about the food groups. I try hard to keep up with the latest nutrition information I like learning about what to eat for breakfast.

Table 2
Adjusted Mean Posttest Scores + of Students on Knowledge, Attitude and Dietary Behavior Instruments

Instrument	Junior High		Senior High	
	E	C	E	C
Knowledge	N = 236	N = 133	N = 265	N = 114
	23.48**	17.04	29.26**	23.92
Attitude Scales	N = 236	N = 130	N = 229	N = 108
1. Caring About Nutrition	3.50	3.59	3.47**	3.02
2. Eating New Foods	3.44	3.36	3.62*	3.36
3. Nutrition Affects Health	4.18	4.15	4.16**	3.82
4. Learning About Nutrition	3.16	3.13	3.00*	2.69

+ Adjusted mean pretest scores are posttest scores adjusted for variations in pretest scores.

* $p < 0.001$

** $p < 0.0001$

RESULTS

For both grade levels the knowledge, attitude, and dietary behavior posttest scores of the nonpretested control group did not significantly differ from posttest scores of the pretested control group. This finding indicates that pretesting did not affect posttest scores. Table 2 contains the adjusted mean knowledge posttest scores for the experimental group and for the control group that was pretested. The data indicate that, at both grade levels, the experimental group achieved significantly higher knowledge scores ($p < .001$).

The adjusted mean attitude postscores of the junior high experimental and control groups did not differ significantly. In contrast, the adjusted mean attitude postscores of the senior high experimental group were significantly higher than the scores of comparable controls on all four attitude scales (Table 2). At both grade levels, adjusted mean dietary post-scores of experimental and control students did not differ significantly. The regression analysis revealed no consistent relationships between dietary behavior scores and the other variables examined including nutrition knowledge and attitude scores, students' gender, years students had enrolled in home economics courses, and whether or not a nutrition unit was included in the students' health class.

Table 3
Stepwise Regression Analysis with Post Scale Scores as the Dependent Variable*

Dependent Variable	Independent Variables	Jr. High	Sr. High
Knowledge Test			
	Knowledge Prescore	+	+
	Posttest Attitude: Caring About Nutrition	+	+
	Posttest Attitude: Nutrition Affects Health	+	0
	Enrollment in Home Economics Courses	+	0
	Posttest Attitude: Learning About Nutrition	0	-
Attitude: Eating New Foods			
	Pretest Attitude: Eating New Foods	+	+
	Nutrition as a component of health classes	+	0
	Posttest Attitude: Caring About Nutrition	+	0
	Years Enrolled in Home Economics	0	-
	Posttest Attitude: Learning About Nutrition	+	+
	Post knowledge	0	+
Attitude: Caring About Nutrition			
	Pretest Attitude: Caring About Nutrition	+	+
	Post knowledge	+	+
	Posttest Attitude: Nutrition Affects Health	+	+
	Posttest Attitude: Learning About Nutrition	+	+
Attitude: Nutrition Affects Health			
	Pretest Attitude:	+	+
	Post knowledge	0	+
	Posttest Attitude: Caring About Nutrition	+	+
	Posttest Attitude: Learning About Nutrition	+	+
	Years Enrolled in Home Economics	0	-
Attitude: Learning About Nutrition			
	Pretest Attitude: Learning About Nutrition	+	+
	Post knowledge	0	-
	Posttest Attitude: Caring About Nutrition	+	+
	Posttest Attitude: Eating New Foods	+	+
	Posttest Attitude: Nutrition Affects Health	+	+

*The + symbol indicates that the independent variable was a positive predictor of the dependent variable.
The - symbol indicates that the independent variable was a negative predictor of the dependent variable.
A 0 indicates that the independent variable was not a significant predictor of the dependent variable.

When the influence of pretest scores was controlled, post-scores on the attitude scale, Caring About Nutrition, was the only variable that accounted for a significant amount of the variation in knowledge scores at both grade levels (Table 3). At the junior high level, having been previously enrolled in home economics classes, and postscores on the attitude scale Nutrition Affects Health, were significant predictors of knowledge postscores. At the senior high level, a negative relationship was found between postscores on the nutrition knowledge test and the Learning About Nutrition attitude scale.

Table 3 also reveals that at both grade levels, postscores on the attitude scales, Learning About Nutrition and Caring About Nutrition, explained a significant amount of the variation in each other's postscores on all other attitude scales. In addition, at both grade levels, postscores on the attitude scale, Nutrition Affects Health, accounted for a significant amount of variation in postscores on the Caring About Nutrition and Learning About Nutrition attitude scales. All the relationships were positive. Knowledge postscores explained a significant amount of the variance in all the attitude scale scores at the senior high level, but the relationship was not consistent. Students having higher knowledge postscores had higher scores on all the attitude scales except Learning About Nutrition, and in that case they had lower scores.

DISCUSSION AND CONCLUSIONS

This research study indicates that instruction using *Nutrition In a Changing World* improved the nutrition knowledge of junior high and senior high students enrolled in health courses. Because the curriculum is sequential for preschool through grade 12, a longitudinal study (12 years or more) would more accurately assess the curriculum's effect on nutrition knowledge. The study also indicates that this curriculum improved the attitude scores of senior high but not junior high students. This finding may be due to a difference in maturity between the two age levels. Perhaps the physical and emotional changes that occur at the junior high level affected the scores of the younger students. Conversely, the senior high students may have been influenced by a greater exposure to nutrition through schooling.

The failure to show an effect of the instruction of dietary behavior may be due to a lack of sensitivity of the instrument used. The dietary behavior instrument examined only the frequency that nutrient-dense foods were consumed. Though the researchers could not detect any change between pretesting and posttesting, it is possible that there was a reduction in the amount of high sugar, high fat, and high sodium foods eaten — factors that the instrument was not designed to detect. In addition, many students may not have had enough control over the foods available to them to make dietary behavior changes, or, the study may have been too short to give students time to make changes.

Improved knowledge scores and little change in attitude and/or dietary behavior scores are often reported in nutrition curriculum evaluation studies.' 'I[5] Such findings may be due to the difficulty in changing attitudes and behavior formed over a lifetime through short-term nutrition education programs. Perhaps a longer period of instruction, preferably as a regular part of the school's curriculum from preschool through grade 12, may be needed to bring food/nutrition attitude and dietary behavior changes.

The consistent and positive relationships among the three attitude scales, Learning About Nutrition, Caring About Nutrition, and Nutrition Affects Health, likely indicates that all three scales reflect closely related feelings about nutrition. The relationships among these scales may have occurred because students were beginning to believe or know that nutrition does affect health and that to be healthy they need to be concerned about what they eat, and they need to learn how to nourish themselves. The Eating New Foods attitude scale was not consistently related to the other three scales which may indicate that this scale was reflecting a somewhat different dimension of students' feelings about nutrition.

The overall goal of nutrition education is to improve dietary behavior. Because there are many intervening factors, the goal is difficult to accomplish. The knowledge gain and attitude improvement may impact on students' food intake in the future when they have more control over their diets and when they become responsible for their childrens' diets. Though the results of the study do not reflect immediate change in dietary

behavior, the preparation of students enrolled in Health Education courses to be informed decision-makers in the future is evidence of success.

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